

Claim Amendments

1. (currently amended) A method for detecting a target molecule or target molecules, said method comprising:

(a) bringing a plurality of electrodes supported by a semiconductor substrate into proximity with a reaction medium comprising a sample suspected of containing a target molecule or target molecules, each of said electrodes comprising at least one target probe that binds to a target molecule to form a bimolecular complex, said target probe having covalently coupled thereto a redox active moiety selected from the group consisting of transition metal complexes and non-enzymatic organic electron donors and acceptors or said target probe having attached thereto one member of a non-enzymatic ligand-bioconjugate pair that binds to the other member of said non-enzymatic ligand-bioconjugate pair comprising a redox active moiety selected from the group consisting of transition metal complexes and non-enzymatic organic electron donors and acceptors,

(b) selectively addressing a plurality of cells within said semiconductor substrate

(i) to apply a stimulus to each of said electrodes to activate a predetermined redox active moiety that is associated with an electrode, and

(ii) to detect, by means of said electrodes, corresponding responses produced as a result of said activation of said redox active moieties,

the magnitude of said corresponding responses indicating the presence or absence of a target molecule or target molecules in said sample wherein said stimulus is applied using an analog bus, which cooperates with circuitry on or off said semiconductor substrate to apply said stimulus to said electrode, and wherein said corresponding response is detected using an analog bus, which cooperates with circuitry on or off said semiconductor substrate to detect said corresponding response from said electrode.

2. (original) A method according to Claim 1 wherein said stimulus is voltage or current and said corresponding response is current or voltage, respectively.

3. (original) A method according to Claim 1 wherein said cell is addressed digitally.

Claims 4-10. (canceled)

11. (original) A method according to Claim 1 wherein said detecting comprises the use of voltammetry or potentiometry.

12. (currently amended) A method for detecting a target molecule or target molecules, said method comprising:

(a) bringing a plurality of electrodes supported by a semiconductor substrate into proximity with a reaction medium comprising a sample suspected of containing a target molecule or target molecules, each of said electrodes comprising at least one target probe that binds to a target molecule to form a bimolecular complex, said target probe having covalently coupled thereto a redox active moiety selected from the group consisting of transition metal complexes and non-enzymatic organic electron donors and acceptors or said target probe having attached thereto one member of a non-enzymatic ligand-bioconjugate pair that binds to the other member of said non-enzymatic ligand-bioconjugate pair comprising a redox active moiety selected from the group consisting of transition metal complexes and non-enzymatic organic electron donors and acceptors,

(b) selectively applying electrical signals to each of said electrodes to activate a predetermined redox active moiety that is associated with an electrode, and

(c) detecting, by means of said electrodes, corresponding electrical signals produced as a result of said activation of said redox active moieties, the magnitude of said corresponding electrical signals indicating the presence or absence of a target molecule or target molecules in said sample wherein said electrical signals are applied using an analog bus, which cooperates with circuitry on or off said semiconductor substrate to apply said electrical signals to each of said electrodes, and wherein said corresponding response is detected using an analog bus, which cooperates with circuitry on or off said semiconductor substrate to detect said corresponding electrical signals from said electrodes.

13. (original) A method according to Claim 12 wherein said selectively applied electrical signals are voltages and said corresponding electrical signals are current or potential difference or a combination thereof.

Claims 14-20. (canceled)

21. (original) A method according to Claim 12 wherein said detecting comprises the use of voltammetry or potentiometry.

Claims 22-61. (canceled)

62. (previously presented) A method according to Claim 1 wherein said at least one target probe is an oligonucleotide probe and said redox active moiety is covalently attached to a nucleotide of said oligonucleotide probe.

63. (previously presented) A method according to Claim 62 wherein said redox active moiety is covalently attached to the 3' or 5' nucleotide of said oligonucleotide probe.